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U.S. Department of Energy
Idaho Operations Office

***Construction Complete Report for the Idaho
National Engineering and Environmental
Laboratory, Central Facilities Area, Operable
Unit 4-13, Transformer Yard (CFA-10)***



Idaho National Engineering and Environmental Laboratory

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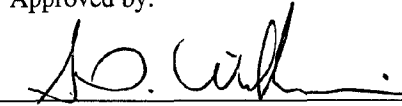
Prepared for the
U.S. Department of Energy
Idaho Operations Office

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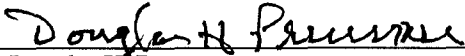
Approved by:



Stephen G. Wilkinson
WAG 4 Project Manager

4/17/02

Date



Douglas H. Preussner
WAG 4 Project Engineer

4/17/02

Date

ABSTRACT

This report describes the remedial action for the Waste Area Group 4, Operable Unit 4-13 Transformer Yard (Central Facilities Area [CFA]-10). The primary remedial action objective for this site was to prevent exposure to lead at concentrations over 400 mg/kg, the Environmental Protection Agency's residential screening level for lead. Because there were no toxicity data for lead, the Environmental Protection Agency's residential screening criterion of 400 mg/kg was set as the final remediation goal. No other contaminants posed an unacceptable risk. The remedial action goals for the site were achieved by removing the contaminated soils. In order to meet the final remediation goal, all soil exceeding 400 mg/kg was excavated from the Transformer Yard. Soils containing lead concentrations in excess of 5 mg/L (by toxicity characteristic leaching procedure) were determined to be Resource Conservation and Recovery Act hazardous waste. These soils were properly packaged and transported to a permitted Treatment, Storage, and Disposal Facility offsite. Soils containing lead concentrations below the regulatory level for designation as Resource Conservation and Recovery Act hazardous waste (5mg/L) were designated as nonhazardous wastes and were transported and disposed of at the CFA landfill. The remedial action was completed as described in the work plan, with few exceptions, and as detailed in Section 4 of this report.

CONTENTS

ABSTRACT.....	iii
ACRONYMS.....	vii
1. INTRODUCTION.....	1
1.1 Organization of the Construction Complete Report	1
1.2 Background.....	2
1.3 Physical Site Description	4
1.4 Remedial Action Objectives	5
1.5 Selected Remedy	5
2. DISCUSSION OF REMEDIATION ACTIVITIES.....	7
2.1 Remedial Action Working Documents.....	7
2.2 Site Preparation and Mobilization	7
2.2.1 Personnel Training Requirements.....	8
2.2.2 Staging and Storage of Equipment and Supplies	8
2.2.3 Regulatory Compliance	8
2.2.4 INEEL Work Control Requirements.....	9
2.3 Remedial Action.....	9
2.3.1 Site Preparation.....	9
2.3.2 Remediation Activities	10
2.4 Sampling and Analysis	11
2.5 Occupational Health and Safety	11
2.5.1 Industrial Hygiene Summary	11
2.6 Decontamination	12
2.7 Site Restoration	12
2.8 Demobilization.....	12
3. COSTS.....	13
4. MODIFICATIONS TO THE REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN.....	14

5.	QUANTITIES AND TYPES OF WASTES GENERATED	15
5.1	Waste Minimization and Segregation.....	15
5.2	Packaging and Labeling.....	15
5.3	Waste Types.....	15
6.	PREFINAL AND FINAL INSPECTION.....	17
7.	SUMMARY AND VERIFICATION OF WORK PERFORMED.....	18
7.1	Summary of Work Performed.....	18
7.2	Verification of Work Performed	18
7.3	Performance Standards and Construction Quality Control.....	19
8.	CERTIFICATION THAT REMEDY IS OPERATIONAL AND FUNCTIONAL	20
9.	REFERENCES.....	21
Appendix A—WAG 4 Final Grade Drawing		
Appendix B—Photographic Record		
Appendix C—Analytical Data Summaries Pre-Remediation and Post-Remediation		
Appendix D—Prefinal Inspection Checklist, Limitations and Validation Report Transmittal Letter, and Closeout Letter for Final Inspection		
Appendix E—Certificates(s) of Disposal		
Appendix F—X-Ray Fluorescence Survey of CFA-010 Transformer Yard for Lead (Pb) in Surface Soil Comparison of Field and Laboratory Analysis		

FIGURES

1.	Idaho National Engineering and Environmental Laboratory	3
2.	Sample locations for preremediation sampling.....	4

TABLES

1.	Contaminant of concern and final remediation goal for the Transformer Yard (CFA-10).....	6
2.	Remedial design/remedial action costs.....	13
3.	WAG 4 waste summary.....	16

ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
D&D	decontamination and dismantlement
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
EPA	Environmental Protection Agency
FFA/CO	Federal Facility Agreement and Consent Order
FRG	final remediation goal
IDEQ	Idaho Department of Environmental Quality
INEEL	Idaho National Engineering and Environmental Laboratory
LDR	land disposal restriction
MCP	management control procedure
OU	operable unit
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
TCLP	toxicity characteristic leaching procedure
WAG	waste area group
XRF	x-ray fluorescence

Construction Complete Report for the Idaho National Engineering and Environmental Laboratory, Central Facilities Area, Operable Unit 4-13, Transformer Yard (CFA-10)

1. INTRODUCTION

In accordance with the *Federal Facility Agreement and Consent Order* (FFA/CO) (Department of Energy Idaho Operations Office [DOE-ID] 1991) between the Department of Energy (DOE), the Environmental Protection Agency (EPA), and the Idaho Department of Environmental Quality (IDEQ), hereafter referred to as the Agencies, DOE submits this *Construction Complete Report for the Idaho National Engineering and Environmental Laboratory, Central Facilities Area (CFA), Operable Unit 4-13, Transformer Yard (CFA-10) (Draft)*.

The submittal of this Construction Complete Report (a secondary document) was defined in the *Central Facilities Area, Waste Area Group 4, Operable Unit 4-13 Remedial Design/Remedial Action Scope of Work* (DOE-ID 2000a). At the completion of the CFA-04 remedial action, a final Remedial Action Report (an FFA/CO primary document) will be submitted to the Agencies, which compiles this Construction Complete Report and the CFA-08 and CFA-04 Construction Complete Reports.

Under the current remediation management strategy outlined in the FFA/CO (DOE-ID 1991), the location identified for the remedial action is designated as the Waste Area Group (WAG) 4, Operable Unit (OU) 4-13 Transformer Yard (CFA-10) at the Idaho National Engineering and Environmental Laboratory (INEEL).

This report describes the work performed, discusses any modifications to the remedial design, and documents the final status of the remedial action.

1.1 Organization of the Construction Complete Report

This Construction Complete Report describes the activities associated with the WAG 4 remedial action for the Transformer Yard (CFA-10). The following are brief descriptions of the Construction Complete Report's sections and appendices.

- Section 1 describes the background and history of WAG 4 and provides an overview of the selected remedies for the areas of concern
- Section 2 summarizes the remedial action activities
- Section 3 outlines the costs incurred during the remedial action
- Section 4 describes the modifications to the Remedial Design/Remedial Action Work Plan
- Section 5 describes the waste streams generated during the remedial action
- Section 6 addresses the prefinal and final inspection checklists
- Section 7 includes the summary and verification of the work performed

- Section 8 provides certification that the remedial action functions as designed and meets the remedial action goals and objectives
- Section 9 lists the references
- Appendix A, As-built drawings detailing remedial action removal activities
- Appendix B, Photographs of the sites and remediation activities
- Appendix C, Preremediation/postremediation sample analytical data summaries
- Appendix D, Prefinal inspection checklist
- Appendix E, Certificate(s) of destruction
- Appendix F, X-Ray Fluorescence Survey of CFA-010 Transformer Yard for Lead (Pb) in Surface Soil Comparison of Field and Laboratory Analysis.

1.2 Background

Located 51 km (32 mi) west of Idaho Falls, Idaho, the INEEL is a government-owned, contractor-operated facility managed by the DOE-ID (Figure 1). Occupying 2,305 km² (890 mi²) of the northeastern portion of the Eastern Snake River Plain, the INEEL encompasses portions of five Idaho counties: Butte, Jefferson, Bonneville, Clark, and Bingham.

The CFA is located in the south-central portion of the INEEL and has been used since 1949 to house many of the support services for all of the operations at the INEEL, including administrative offices, research laboratories, a cafeteria, emergency and medical services, construction and support services, workshops, warehouses, vehicle and equipment pools, bus system, and laundry facilities (Figure 1 and Appendix A, Figure C-1). The types of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remedial sites at CFA include landfills, underground storage tanks, aboveground storage tanks, drywells, disposal ponds, soil contamination areas, and a sewage plant.

The fenced Transformer Yard was adjacent to CFA-667, which was a metalworking shop. The CFA-677 is now a storage building. Although scrap metal and/or waste from the metalworking shop were not known to have been routinely dumped into the yard, the yard was contaminated with metals. Lead was the only contaminant of concern identified in the remedial investigation/feasibility study that posed an unacceptable risk to human health. No specific pattern of welding activities or waste disposal of lead could be identified. Based on the collocation of lead and copper in the sampling results, copper, which was present in quantities only slightly above background levels, was expected to be remediated with lead. In addition, lead and copper were identified as contaminants of concern for ecological risk. The final remediation goal (FRG) of 400 mg/kg for lead was set at the EPA's residential screening level to be protective of human health. No FRGs pertaining to ecological risk were identified for lead at CFA-10.

X-ray fluorescence (XRF) survey data of surface soil in the Transformer Yard, which were obtained post-Record of Decision (ROD), indicated that the highest levels of lead contamination (>400 mg/kg) were located along the southeast side (Sectors 1 and 5) of the building. Some lead contamination was also found in the soil along either side of the concrete pad (Sectors 2 and 6) and along the northwest side (Sector 9) of the building (see Figure 2 for locations). Based upon the results of the XRF survey, it was evident that this pattern of contamination was consistent with storm water run-off from the roof. From an interview with a former worker at this facility, it was discovered that lead smelting had occurred in the building. Based upon the information provided by facility personnel, it was

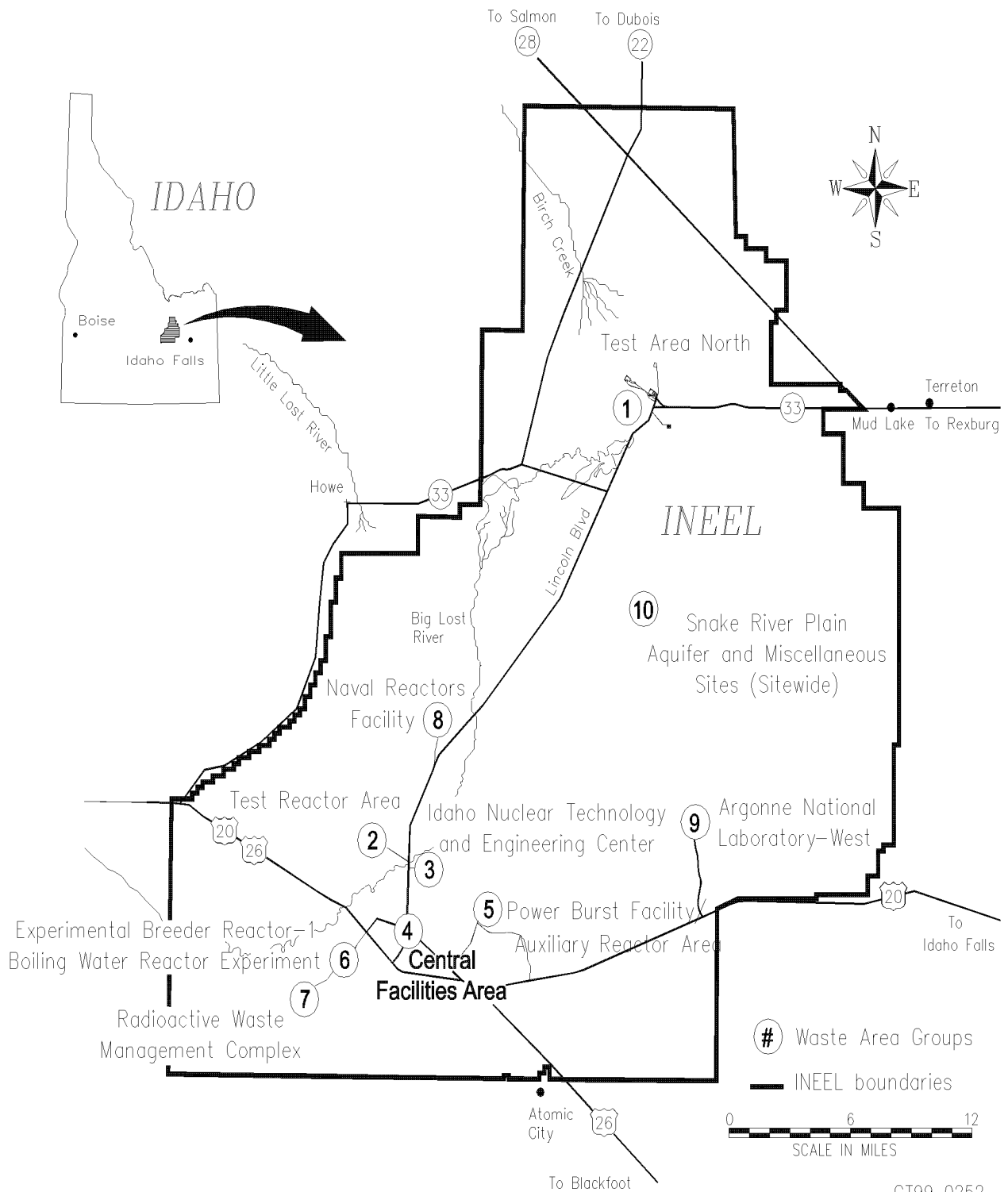


Figure 1. Idaho National Engineering and Environmental Laboratory.

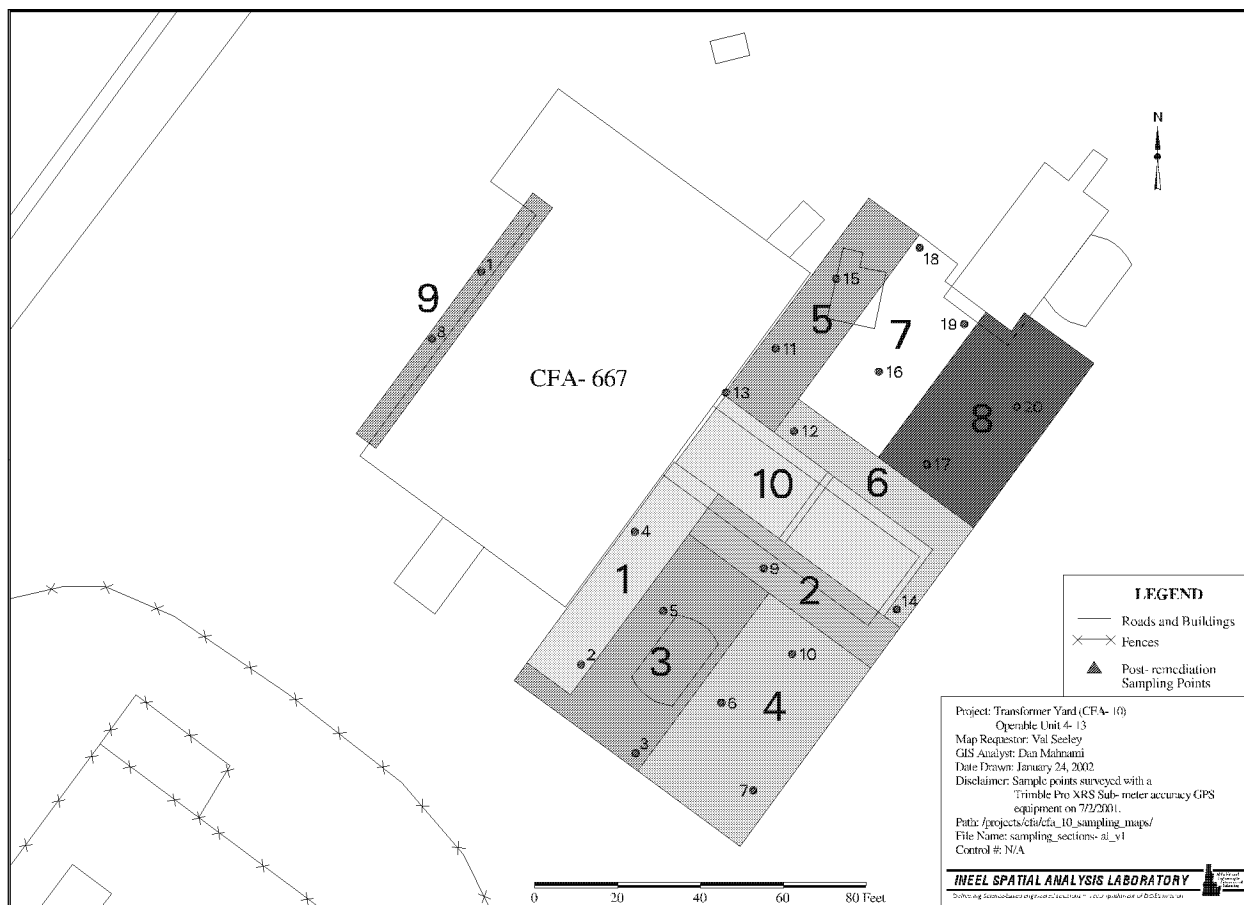


Figure 2. Sample locations for preremediation sampling.

determined that the observed pattern of contamination was consistent with rain-washing of the smelting operation emissions, which had settled on the roof. A recent XRF survey of the building gutters and vents indicated that lead contamination is no longer present (see Appendix F).

1.3 Physical Site Description

The CFA-10 was a fenced yard area located immediately adjacent to the southeast side of the CFA-667 building (Appendix A, Drawing C-2). The Transformer Yard is oriented northeast/southwest and occupies approximately 808 m² (8,694 ft²) (DOE-ID 2000b). The Transformer Yard has the dimensions of 43 m (141 ft) along its southeast border, 19.2 m (63 ft) along the southwest border, 38.4 m (126 ft) along the northwest border, and 20.4 m (67 ft) along the northeast border (DOE-ID 2000b). The remedial site surface was composed of soil (DOE-ID 2000b) with a concrete pad (6.1 m [20 ft] wide by 20 m [65 ft] long) oriented northwest/southeast located at the center of the Transformer Yard (DOE-ID 2000b). The pad had a grated rectangular drainage structure oriented northeast/southwest in the center of the pad. The pad drainage discharged to the soil surface at the northeastern and southwestern ends of the grated drainage structure.

The surface soil at the Transformer Yard consists of the Big Lost River alluvial deposits. The alluvial deposits are predominantly fine-grained silts of eolian origin as well as clays, silts, sands, and a relatively small quantity of gravels deposited by streams. Underlying the surficial soil are thick sequences of basalt lava flows and thin sedimentary interbeds that extend below the water table to a depth of several

thousand feet. The composition of the sedimentary interbeds is similar to the surficial alluvial soil. There are no groundwater-monitoring wells specifically associated with the Transformer Yard. Monitoring wells at WAG 4, north of CFA-10, indicate that the depth from land surface to the water table is approximately 150 m (492 ft) with the general direction of groundwater flow being to the south (DOE-ID 2000b).

1.4 Remedial Action Objectives

The remedial action objectives (RAOs) for CFA-10 were developed in accordance with the *National Oil and Hazardous Substances Contingency Plan* (EPA 1990) and were based on the results of the human health and ecological risk assessments, as outlined in the *Final Comprehensive Record of Decision for Central Facilities Area Operable Unit 4-13* (DOE-ID 2000b). The intent of the RAOs is to set goals for the protection of human health and the environment. The following describes the RAOs for CFA-10 based upon the decisions in the ROD (DOE-ID 2000b).

- Prevent exposure to lead at concentrations over 400 mg/kg, which is the EPA's residential screening level for lead.

The FRG for CFA-10 was a lead concentration of equal to or less than 400 mg/kg. Because there are no toxicity data for lead, the EPA residential screening criterion of 400 mg/kg was set as the FRG. No other contaminants posed an unacceptable risk. In order to meet the FRG, all soil exceeding 400 mg/kg was to be excavated from the Transformer Yard. Data indicated that excavating the top 0.5 ft of soil would likely satisfy the RAO for residential exposure to lead. All excavated Transformer Yard soil with lead concentrations greater than the 5-mg/L Resource Conservation and Recovery Act (RCRA)-characteristic hazardous waste level would be sent to a permitted offsite Treatment, Storage, and Disposal Facility. Soil with lead concentrations less than the 5-mg/L toxicity characteristic leaching procedure (TCLP), but greater than 400 mg/kg, would be disposed of at the CFA landfill.

1.5 Selected Remedy

Based on consideration of the requirements of CERCLA, the detailed analysis of alternatives, and public comments, the Agencies selected a remedy for the Transformer Yard (CFA-10). The selected alternative consisted of:

- Characterizing and excavating soil exceeding the FRG
- Performing verification sampling to ensure that there was no contamination remaining at the remedial site exceeding the FRG following excavation
- Stabilizing soil that exhibits the RCRA toxicity characteristics for lead at an offsite facility
- Disposing of the treated soils at a permitted offsite facility
- Backfilling the excavation with uncontaminated soil to match the original grade.

Performance standards were implemented as design criteria for the remedial site to ensure that the selected remedy is protective of human health and the environment. The Transformer Yard was not anticipated to require a 5-year review since all contaminated soil above the FRG would be excavated and disposed of. As indicated in the Remedial Design/Remedial Action Work Plan (DOE-ID 2001a), this remedy has two minor changes to the original statement of work: (1) the lead-contaminated soil would be stabilized offsite instead of onsite, and (2) the Transformer Yard would not be revegetated after remedial action. Table 1 shows the contaminant of concern and final remediation goal for the Transformer Yard (CFA-10).

Table 1. Contaminant of concern and final remediation goal for the Transformer Yard (CFA-10).

Remedial Site	Contaminant of Concern	Final Remediation Goal (mg/kg)
Transformer Yard (CFA-10)	Lead	400

2. DISCUSSION OF REMEDIATION ACTIVITIES

2.1 Remedial Action Working Documents

The *Remedial Design/Remedial Action Work Plan Idaho National Engineering and Environmental Laboratory Central Facilities Area, Operable Unit 4-13 Transformer Yard (CFA-10) (DOE-ID 2001a)* lists the design criteria, describes the remedial design and how it was to be implemented for the remedial action, and serves as the guidance document for the WAG 4 remedial action. The following documents were included as appendices to the Remedial Design/Remedial Action Work Plan:

- Design Drawings that detailed the prerediation conditions (e.g., topography and fencing at the site), as well as the work to be performed during the remedial action
- Technical Specifications that provided the general terms and conditions required for completion of the remedial action
- Quality Designation and Record that assigned a quality level to the remedial action
- Waste Management Plan that described the management of all wastes anticipated to be generated during the remedial action for the CFA-10 Transformer Yard
- An Engineering Design File for the post-ROD XRF surveying results for lead contamination
- An Engineering Design File for the Transformer Yard Remedial Action Hazard Classification.

In addition, three separate documents were affiliated with the Remedial Design/Remedial Action Work Plan:

- The Field Sampling Plan (DOE-ID 2001b) described the sampling and analyses required during the remedial action
- The Quality Assurance Project Plan (DOE-ID 2000c) described the necessary steps required to ensure the quality of project data
- The Health and Safety Plan (INEEL 2001) described the possible hazards and required steps to protect the health and safety of the workers.

2.2 Site Preparation and Mobilization

The following subsections discuss the site preparation and mobilization efforts performed prior to the start of the remedial action.

- Assembled the project work team and conducted a prejob briefing on work task assignments in accordance with the Health and Safety Plan (INEEL 2001) and management control procedure (MCP)-3003, "Performing Pre-Job Briefings and Post-Job Reviews." Specific elements of the prejob briefing included identification of work to be performed and communication of the hazards and mitigation to enable safe completion of the work.
- Delivered and stored equipment and materials adjacent to the remedial site.

- Construction management inspection and acceptance before heavy equipment was brought onsite.
- Identified and demarcated the work areas, including installation of security fencing, signs, and posting.
- Obtained the required INEEL permits and authorizations for remedial activities.

2.2.1 Personnel Training Requirements

Prior to the start of fieldwork, all workers were required to have the following training as specified in Section 4 of the Health and Safety Plan (INEEL 2001):

- Site-specific training as required by the Health and Safety Plan
- 40-hour HAZWOPER
- Hazardous Waste Operations 24-hour “on-the-job” training
- 8-hour HAZWOPER site supervisor, as necessary
- Lead Awareness Training
- Hearing conservation
- HAZMAT employee general awareness training
- CPR and medic first aid, as necessary.

Certifications of training and training updates were maintained in the training database on the INEEL Intranet.

2.2.2 Staging and Storage of Equipment and Supplies

A staging area was established adjacent to the Transformer Yard. The area was used to store and operate project-related equipment and material close to the work, without having personnel enter a contaminated area. The staging area served as a command post from which personnel conducted remedial operations, documented activities, and performed other functions necessary to implement the Remedial Design/Remedial Action Work Plan. Another area between the Transformer Yard and the Staging Area was designated for decontaminating personnel, equipment, and materials leaving the remediation site. A control point restricting entrance and egress between the decontamination area and the staging area was established. All staging activities, and storage of equipment and material, were done in accordance with the Transformer Yard Health and Safety Plan (INEEL 2001).

2.2.3 Regulatory Compliance

The OU 4-13 remedial action complied with all applicable or relevant and appropriate requirements, as outlined in Section 4.2 of the Remedial Design/Remedial Action Work Plan (DOE-ID 2001a).

2.2.4 INEEL Work Control Requirements

To comply with INEEL procedures and requirements for conducting fieldwork, the following items were completed prior to the start of the remedial action:

- Standard-101 Work Packages
- Project listed on CFA Work Planning Schedules
- Formal prejob briefing
- Safe Work Permits
- Subsurface investigation
- National Environmental Policy Act documentation and Environmental Checklist
- Storm Water Pollution Prevention exemption
- Spill prevention and control measures
- Cultural Resources and Historical Property Survey.

Prior to the start of each day's work, a plan-of-the-day meeting was held to review the day's work activities and go over lessons learned from the previous day's activities and equipment inspections. At the end of each day, postjob reviews were conducted to review the day's work completed.

2.3 Remedial Action

The remedial action work at the CFA-10 Transformer Yard consisted of soil excavation, disposal of nonhazardous waste at the CFA landfill, and offsite INEEL treatment and disposal of RCRA hazardous waste. Additional detail is provided in the following section for the remedial activities that occurred at the OU 4-13 Transformer Yard. Deviations from the original work plan are noted, and a detailed discussion of these deviations is presented in Section 4 of this report. The details of the remedial action field activities are contained in the INEEL Environmental Restoration Operations Field Logbook (ER-38-01), located in the project files.

2.3.1 Site Preparation

Site preparation activities included preremediation soil sampling and analysis for lead contamination. The specific work task elements necessary to complete this work are identified in Section 5.3 of the Remedial Design/Remedial Action Work Plan (DOE-ID 2001a).

Starting on June 19, 2001, the remedial site was cleared of all fencing material and debris. Clearing activities were performed in a manner that minimized any disturbance to the underlying soil. The chain-link fence, supporting posts, gates, and signs that encompassed three sides of the Transformer Yard (as shown in Drawing C-2, Appendix A) were removed.

The fencing material and debris were disposed of in the CFA landfill. After removal of the fencing material, yellow and black rope and signs were used to designate the work zone. The visible lead left on the ground was picked up, placed in plastic bags, and delivered to Waste Generator Services for

recycling. The industrial hygienist had each team member wear an Escort ELP Pump during the cleanup of the visible lead. No vegetation removal was done.

Equipment staged at the area included excavation equipment, equipment for sampling, clean water for decontamination, emergency spill control equipment, and waste containers.

2.3.2 Remediation Activities

Preremediation sampling to determine the waste disposition of the contaminated soils was performed in April 2001 (see Figure 2 for locations). The results indicated that all areas had total lead >400 mg/kg in the top 6 inches of soil. The highest lead levels occurred in Sector 5 at 9,260 mg/kg; Sector 1 at 3,140 mg/kg; and Sector 4 at 1,960 mg/kg. Sector 5 also had levels of 1,540-mg/kg total lead at 12 inches. The only area that had TCLP lead >5 mg/L, based on the previous RI/FS sampling, was in an 8 × 10-ft area near the southeast corner of the concrete pad in Sector 2. The complete results of the sampling are shown in Appendix C. The results from the preremediation sampling event confirmed that the concrete pad was not lead contaminated above the FRG of 400 mg/kg, and the concrete pad would not need to be removed.

The remedial activities at the Transformer Yard (CFA-10) included excavation and removal of lead-contaminated soils above the 400-mg/kg FRG. The INEEL decontamination and dismantlement (D&D) personnel performed the remediation activities. Start of excavation was delayed on June 20, 2001, when a killdeer nest with eggs was discovered in Sector 5. The Migratory Bird Act of 1918 prohibits the harm or removal of a migratory bird or her eggs. A rope was placed on the south side of the concrete pad to ensure that the nest would not be disturbed, and excavation activities were moved to the west side of CFA-667 (Sector 9) until the eggs in the nest hatched. By Monday morning, June 25, 2001, there was no sign of the bird or her hatchlings and excavation resumed on the north side of the concrete pad. As killdeer make their nests in rocks, and hatchlings follow their mother on foot once they are born, there is generally little evidence after the family moves on.

A track hoe was used to excavate the top 6 inches of soil in all sectors of the remediation area that had lead concentrations >400 mg/kg. The top 6 inches of soil from Sector 5 was placed in a roll-off container for offsite hazardous waste treatment and disposal, based on preremediation sampling that indicated a cadmium TCLP that exceeded the land disposal restriction (LDR) standard of 1 mg/L. The only area that had TCLP lead >5 mg/L was the top 6 inches of an 8 × 10-ft area near the southeast corner of the concrete pad in Sector 2, which was also placed into the hazardous waste roll-off container. This was done because a hot spot in that area had been identified during remedial investigation/feasibility sampling that exceeded the lead TCLP LDR standard of 5 mg/L. The remaining top 6 inches of soil from the other sectors was hauled by dump truck to the CFA landfill for disposal.

As an additional precaution, the next 12 inches of soil in Sector 5 and the next 6 inches of soil in Sector 1 were removed in 6-inch increments and stockpiled in soft-sided bags until the results of remediation sampling were received from the laboratory. Upon receipt of the laboratory results indicating that all stockpiled soil passed the TCLP and was nonhazardous, the soil was hauled to the CFA landfill for disposal. The only exception to this was a dark-stained soil area in Sector 5 near the building close to the concrete pad that was encountered during excavation of the top 6 inches of soil in this area. An XRF survey of the area indicated high metals and it was assumed that the soil would exceed the TCLP. All of the dark-stained soil was placed into a hazardous waste roll-off container for offsite treatment and disposal.

During excavation of the soil in Sector 3, south of the concrete pad, a circular concrete structure was discovered (see Appendix B, Figure B-1). The location of the concrete structure is 34 ft from

CFA-667 and 30.5 ft from the concrete pad. A sketch is also documented in the field logbook (ER-38-01), which can be found in the project files. The concrete structure was not part of the remedial action for this site, and during site restoration, the concrete structure was covered with soil. Further investigation of the concrete structure is underway.

The excavated area was backfilled with clean, native gravel pit soil; graded to match the original slope of the area; and compacted.

2.4 Sampling and Analysis

Sampling activities for the Transformer Yard (CFA-10) included the following:

- Preremediation Sampling—a composite consisting of three subsamples from each of the 10 grids was collected and analyzed for total and TCLP lead
- Remediation Sampling—three samples at a depth of 6–12 inches in Sectors 1 and 5, and 12 to 18 inches in Sector 5, were collected and analyzed for TCLP lead and TCLP cadmium
- Postremediation Sampling—a total of 20 postremediation samples were collected and analyzed for total lead.

Sampling and analysis were performed in support of soil excavation to determine proper disposition of excavated materials and to verify that the remaining soils did not exceed the FRG of 400 mg/kg. Details of the sampling are in the *Field Sampling Plan for the Idaho National Engineering and Environmental Laboratory, Central Facilities Area, Operable Unit 4-13, Transformer Yard (CFA-10)* (DOE-ID 2001b).

Postremediation sampling results ranged from 9.7 mg/kg to a high of 298 mg/kg for total lead. These results were below the FRG of 400 mg/kg. A summary of the analytical data collected during the preremediation, remediation, and postremediation sampling done to support remedial action is presented in Appendix C.

2.5 Occupational Health and Safety

The following sections discuss the personnel industrial hygiene monitoring conducted on the OU 4-13 remedial action. There were no radiological contaminants of concern for the Transformer Yard.

2.5.1 Industrial Hygiene Summary

2.5.1.1 Noise Surveillance. The potential existed to expose personnel who operated heavy equipment and personnel working near the heavy equipment to average noise levels above 85 decibels for an 8-hour time-weighted average. Working in excess of the 85-decibel time-weighted average noise level exceeds the Occupational Safety and Health Administration 29 Code of Federal Regulations (CFR) 1910.95 standard, which requires the project to implement the Company Hearing Conservation Program. The project industrial hygienist conducted routine noise assessments using the “A-scale” noise-level measurements. The results of these noise assessments determined the need for hearing protection and employees at the task site wore acceptable hearing protection, as required.

2.5.1.2 Heat and Cold Stress Surveillance. The majority of the fieldwork took place in the hot summer months. The Health and Safety Plan (INEEL 2001) identified the need to ensure employees did not experience undue heat stress. This was accomplished by the industrial hygienist and the health and

safety officer performing periodic surveillance of personnel and calculating stay times as the conditions dictated. Personnel were trained in identifying the symptoms of heat stress and how to handle a potential victim. Cool, potable drinking water was available at the task sites to help keep personnel hydrated.

2.6 Decontamination

Decontamination was performed per the requirements set forth in Section 10 of the project Health and Safety Plan (INEEL 2001).

2.7 Site Restoration

Backfilling and compacting the excavated areas with clean, native gravel pit soil began on August 8, 2001. The remediated area's surface was graded to match the original slope of the area. The concrete pad was left in place since it was not contaminated with lead above the 400-mg/kg FRG. All other excavated areas of the site were contoured to match the surrounding terrain, using pit run gravel. Any other disturbed areas were returned to their condition prior to remedial action activities. The remedial action was completed on August 20, 2001.

2.8 Demobilization

Final demobilization commenced and was completed on August 20, 2001.

3. COSTS

Total project costs for the OU 4-13 remedial action activities are provided in Table 2. These costs include the INEEL project management, materials, and labor costs associated with the remediation of the site.

Table 2. Remedial design/remedial action costs.

Activity	Cost
FFA/CO Project Management	\$ 117,448
Characterization (pre/confirmation sampling, XRF)	\$ 76,011
Document Preparation (Remedial Design/Remedial Action Work Plan, Sampling and Analysis Plan, Health and Safety Plan, prefinal inspection, fieldwork and waste documents, Construction Complete Report) ^a	\$ 313,355
Remedial action	<u>\$ 107,168</u>
Remedial action total cost	<u>\$ 613,982</u>

a. Includes a \$5K estimate to complete the Construction Complete Report in FY 2002, and a \$30K estimate to complete the CFA-10 portion of the Remedial Action Report in FY 2004.

4. MODIFICATIONS TO THE REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN

Several modifications to the Remedial Design/Remedial Action Work Plan were required during the course of the project. A brief description of each modification is listed below:

- In the spring of 2001, new management took on responsibility for the WAG 4 project; a team decision was made to use onsite union labor D&D personnel instead of a subcontractor to perform the remediation work based on the new management's previous success in using D&D personnel for similar work, the cost-effectiveness of using onsite union labor, and the certainty of meeting the project schedule. These changes were generated due to changes in field conditions and were documented in the field logbook (ER-38-01).
- The concrete pad located in the remedial action area was not removed as planned in the Remedial Design/Remedial Action Work Plan. The results from the prerediation sampling event confirmed that the concrete pad was not contaminated above the 400-mg/kg FRG for lead.
- Soil was excavated in 6-inch increments instead of the 3-inch increments planned for in the Remedial Design/Remedial Action Work Plan. This increment of soil removal was more achievable by large earth-moving equipment.
- Instead of placing excavated soil in transport containers until it was characterized, more representative pre-remediation sampling and analysis was predominantly used to thoroughly characterize the soil before it was excavated. Soft-sided bags were then used during the remedial action to stockpile the 6–18 inches of excavated Sector 5 soil and the 6–12 inches of excavated Sector 1 soil until it was characterized.
- X-ray fluorescence was not used to survey the soil during remediation except as a gross detector of metals in Sector 5. Pre-remediation analytical results did not correlate well enough with XRF results for it to be used as a reliable indicator for additional soil removal. Instead, additional remediation sampling and analysis was performed, as indicated in the Field Sampling Plan (DOE-ID 2001b).

5. QUANTITIES AND TYPES OF WASTES GENERATED

Waste generated during the remedial activities was managed per the requirements delineated in Appendix D of the WAG 4 Remedial Design/Remedial Action Work Plan (DOE-ID 2001a). INEEL Waste Generator Services was responsible for the management of all wastes. This was done per resident procedures at the INEEL.

5.1 Waste Minimization and Segregation

Waste minimization was achieved through design and planning to maintain efficient operations. To achieve this goal, waste streams were segregated by the field activity being conducted at the time of generation. Waste types generated included nonconditional industrial waste, conditional industrial wastes, nonhazardous waste, and hazardous waste. Waste containers were provided for each specific waste stream and were maintained inside the work area until removed for either storage or disposal.

5.2 Packaging and Labeling

Containers used for storing and shipping hazardous waste met the requirements of 40 CFR 262, Subpart C and 40 CFR 264, Subpart I. Wastes were packaged per the criteria set forth in the *Idaho National Engineering and Environmental Laboratory Reusable Property, Recyclable Materials, and Waste Acceptance Criteria Department of Energy Idaho Operations Office* (DOE-ID 1999) and those of the receiving facility that accepted the hazardous waste for disposal. The types of containers used included the following:

- Open-top roll-off containers
- 55-gallon drums
- Waste packaging (soft-sided packaging)
- Bulk waste destined for disposal at the CFA landfill was shipped in a dump truck.

All containers were labeled per resident procedures and in accordance with all applicable state, federal, and local regulations. Table 3 summarizes the wastes that were generated during the remediation activities.

5.3 Waste Types

Various types of wastes were generated. These included debris (personal protective equipment, plastic sheeting, concrete, gravel, wood, etc.), lead, and soil. Other waste forms included unused/unaltered samples, analytical residues, sample containers, residual soils, and contaminated equipment.

Table 3. WAG 4 waste summary.

Waste Stream	Volume	Disposal Site	Status
Nonhazardous lead-contaminated soil	180 yd ³	CFA landfill	Disposed
Hazardous cadmium and lead-contaminated soil	18 yd ³ One roll-off (40,500 lb net)	ONYX	Shipped 7/10/01
Hazardous cadmium and lead-contaminated soil	12 yd ³ One roll-off (27,280 lb net)	ONYX	Shipped 8/20/01
Fencing		CFA landfill	Disposed
Contaminated personal protective equipment	One Drum	ONYX	Shipped 11/11/01

6. PREFINAL AND FINAL INSPECTION

The prefinal inspection of WAG 4 was conducted by the contractor on August 6, 2001, as indicated by the prefinal inspection checklist in Appendix D. The Agencies were informed of the results of the prefinal inspection by e-mail. The items not complete at the time of the prefinal inspection are as follows:

- Postremediation analytical data received, validated, and entered into the Environmental Restoration Information System
- Postremediation data transmitted to DOE-ID, IDEQ, and EPA within 120 days per the FFA/CO
- Hazardous soils disposed of properly (signed Certificate of Destruction/Disposal)
- All CFA-10 hazardous soils and miscellaneous wastes (>5 mg/L TCLP lead or >1 mg/L TCLP cadmium) packaged, labeled, and transported to the appropriate Treatment, Storage, and Disposal Facility.

These items are now complete, and a copy of the closeout letter with this final documentation was sent to the Agencies on November 14, 2001 (see Appendix D).

7. SUMMARY AND VERIFICATION OF WORK PERFORMED

The primary work activities for the OU 4-13 remedial action included:

- Characterizing the soils associated with the CFA-10 Transformer Yard for waste disposition
- Removing contaminated soil and debris
- Packaging, shipping, and transporting remedial action waste
- Verifying that soils remaining in place did not contain contamination in excess of the remedial action goals
- Backfilling and re-contouring the excavated areas.

7.1 Summary of Work Performed

The OU 4-13 remedial action has been completed in accordance with the WAG 4 Remedial Design/Remedial Action Work Plan (DOE-ID 2001a). The remedial action included the following:

- Remediation of the CFA-10 Transformer Yard began on June 18, 2001. The fence was removed and sent to be recycled. Six inches of dirt was removed from the Transformer Yard with an additional removal of 6–18 inches of soil next to the building. (Preremediation sampling data and real-time lead XRF data indicated higher contamination in the soil next to the building.) Excavation was completed on July 2, 2001.
- Disposition of all excavated waste soil was based on preremediation sampling of the soil at the site, with the exception of the dark-stained soil area in Sector 5. The XRF survey of this area indicated high metals and it was assumed that the soil would exceed the TCLP. All stained soil was placed in a roll-off container and disposed of as hazardous waste. Six soft-sided bags were filled with potentially hazardous lead- and/or cadmium-contaminated dirt and were stored at the site until laboratory results from additional remediation sampling determined that the soil could be disposed of at the CFA landfill. Approximately 180 yd³ of nonhazardous lead-contaminated soil (400–10,000 mg/kg lead) was disposed of at the CFA landfill, which included the soil in the six soft-sided bags. A total of 30 yd³ of hazardous cadmium and lead-contaminated soil (including 0.2 yd³ of contaminated debris) was sent to the ONYX Treatment, Storage, and Disposal Facility at Arlington, Oregon.
- After receipt of postremediation confirmatory sampling indicating that all remaining soil at the site met the final remediation goal of 400 mg/kg (EPA's residential screening level) (see Appendix C) and nearly all sectors and average concentration at the site were below the best management practice target of 170 mg/kg, the site was backfilled with natural gravel fill and compacted in mid-August.

7.2 Verification of Work Performed

Verification of the work performed was documented throughout the duration of the project. The field team leader and job site supervisor maintained a daily logbook (ER-38-01) that detailed each day's work activities, including prejob briefings, numbers and names of personnel on the job site, and their functions. Copies of the daily logbooks can be obtained from the project files and on the INEEL Intranet

through the INEEL Optical Imaging System. Periodic management assessments were conducted during the remedial action to verify that work was being completed in accordance with the WAG 4 Remedial Design/Remedial Action Work Plan (DOE-ID 2001a) and on schedule.

A prefinal inspection of the site was conducted on August 6, 2001, to verify that the work outlined in the WAG 4 Remedial Design/Remedial Action Work Plan (DOE-ID 2001a) was accomplished. Results of this inspection are documented in the checklist presented in Appendix D.

An as-built drawing was prepared depicting the Transformer Yard after remedial action. This drawing is provided in Appendix A.

7.3 Performance Standards and Construction Quality Control

This section discusses the performance standards and construction quality control for the remediation activities done for the CFA-10 Transformer Yard.

To ensure quality control of in situ measurements, established standard operating procedures were followed that included calibration and verification requirements for the instruments used. Samples collected and sent to the laboratory were analyzed following standard analytical methods that include requirements for calibration and verification.

Performance standards were implemented to ensure that excavation, treatment, and disposal activities resulted in the following:

- Removing lead-contaminated soil where concentrations exceeded the FRGs (400 mg/kg)
- Sampling the soil to confirm that disposal met treatment standards for lead
- Sampling the Transformer Yard soil to confirm that the remediation activities met or exceeded the FRGs.

Based upon the excavation of contaminated soils in accordance with the requirements of the ROD (DOE-ID 2000b), the remediation of the CFA-10 Transformer Yard is determined to be successful.

8. CERTIFICATION THAT REMEDY IS OPERATIONAL AND FUNCTIONAL

As stated in the ROD (DOE-ID 2000b), the remedial action objectives and the remedial action goals were established to reduce or eliminate the risk to human health and the environment.

This report certifies that the remedies selected in the OU 4-13 ROD (DOE-ID 2000b) and detailed in the Remedial Design/Remedial Action Work Plan (DOE-ID 2001a) have been completed, and the remedies are operational and functional. Operation and maintenance activities or institutional controls will not be required for the Transformer Yard (CFA-10), because all contaminants were removed that would preclude unlimited use.

9. REFERENCES

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- MCP-3003, September 2001, "Performing Pre-Job Briefings and Post-Job Reviews," Revision 9, *Manual 9-Operations*, Operations.